

Claims:

1. A bumper device comprising an approximately tubular cylinder, a rotary shaft which is rotatably arranged in the inside of the cylinder and forms wing portions on an outer peripheral portion of an approximately columnar shaft in a state that the wing portions project to an inner peripheral surface of the cylinder, two side walls which are formed in a spaced-apart manner between the rotary shaft and the inner wall of the cylinder, an oil chamber which is defined by the above-mentioned two side walls, the rotary shaft and the inner wall of the cylinder and in which a viscous fluid is filled, movement restricting flow passages which restrict the movement of the viscous fluid between front-side oil chambers with respect to the rotational direction of the rotary shaft and rear-side oil chambers with respect to the rotational direction of the rotary shaft which are formed by dividing the oil chamber with the wing portions, and selective communication passages which are provided with check valves which selectively restrict the movement of the viscous fluid from the front-side oil chambers to the rear-side oil chambers in response to the rotational direction of the rotary shaft whereby a rotation resistance force having the directivity is applied to the rotary shaft due to the flow resistance which is generated when the viscous fluid moves from the front-side oil chambers to the rear-side oil chambers, wherein

the improvement is characterized in that the movement restricting flow passages are formed between the inner wall of the cylinder and the wing portions and, at the same time, the selective communication passages are formed between the wing portions and one side wall out of two side walls, and the side walls and the check valves are rotated along with the rotation of the wing portions.

2. A damper device according to claim 1, wherein the side wall which defines the selective communication passage is formed of a side wall member which is replaceably engaged with the rotary shaft.

3. A damper device according to claim 2, wherein the check valves are configured such that valve elements which open and close the selective communication passages are movably arranged in valve element accommodating chambers which are formed in the wing portions and/or the side wall member which at middle portions of the selective communication passages.

4. A damper device according to claim 3, wherein the side wall member is arranged movably in the axial direction of the rotary shaft and, at the same time, on at least one of the valve elements and the side wall member which form closing portions with which the valve elements are brought into contact at the time of closing operation, inclined surfaces which are inclined with respect to the moving direction of the valve element and the axial direction of the rotary shaft are formed.

5. A damper device according to claim 4, wherein the valve elements are formed in an approximately columnar shape.

6. A damper device according to any one of claim 1 to claim 5, wherein between the front-side oil chamber and the rear-side oil chamber, a bypass flow passage having a resilient flow passage member which is resiliently deformed to increase a flow passage cross-sectional area when an inner pressure of the viscous fluid is increased is formed and, at the same time, a sealing member which seals between the side wall member and the cylinder is used as the resilient flow passage member.

7. A damper device according to any one of claim 6, wherein an O-ring is used as the resilient flow passage member.

8. A damper device according to claim 1 or claim 2, wherein the check valves are arranged in a state that the valve elements which are brought into contact with and are separated from the wing portions are movable in the circumferential direction of the rotary shaft.

9. A damper device according to claim 8, wherein on at least one of the valve elements and the wing portions which form closing portions with which the valve elements are brought into contact at the time of closing operation, inclined surfaces which are inclined with respect to the moving direction of the valve element and the axial direction of the rotary shaft are formed.

10. A damper device according to claim 8 or claim 9,

wherein the valve elements are constituted by forming valve element portions which are brought into contact with and are separated from the wing portions on an approximately circular annular ring portion which is loosely fitted on the rotary shaft.

11. A damper device according to any one of claim 8 to claim 10, wherein between the front-side oil chamber and the rear-side oil chamber, a bypass flow passage having a resilient flow passage member which is resiliently deformed to increase a flow passage cross-sectional area when an inner pressure of the viscous fluid is increased is formed and, at the same time, the valve elements are used as the resilient flow passage member.

12. A damper device according to any one of claim 1 to claim 11, wherein speed adjusting flow passages which adjust a flow rate of the viscous fluid which moves between the front-side oil chambers and the rear-side oil chambers in response to a rotational angle of the rotary shaft are formed between the side wall and the wing portions, and the speed adjusting flow passages are configured to decrease a flow passage cross-sectional area along with the increase of the rotational angle of the rotary shaft.

13. A damper device according to claim 12, wherein the speed adjusting flow passages are configured to decrease the flow passage cross-sectional area on a rotary finishing end side of the rotary shaft in a plurality of stages.

14. A damper device according to any one of claim 1

to claim 13, wherein an air bleeding groove for bleeding a gas remaining in the oil chamber to the outside at the time of filling the viscous fluid in the oil chamber is formed in the cylinder.